



ANNICK ANSELIN

TECHNETIUM

Element Symbol: **Tc**

Atomic Number: **43**

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Nuclear-based science benefiting all Australians

Technetium is an exceptionally rare, silvery-gray metal that tarnishes slowly in moist air. In powder form, it burns in oxygen to the heptoxide (Tc_2O_7). Technetium dissolves in nitric acid and concentrated sulfuric acid, but is not soluble in hydrochloric acid of any strength. Is an excellent superconductor at temperatures of 11 K and below. Technetium and promethium are notable among the light elements because they both have no stable isotopes.

Technetium can only be produced artificially because most forms or isotopes of it (atoms of the same chemical element with different numbers of neutrons) have an excess of neutrons, making it very unstable.

Technetium was discovered by Carlo Perrier and Emilio Segrè in Italy in 1937. They found the technetium isotope ^{97}Tc in a sample of molybdenum which had previously been bombarded with deuterium nuclei. Technetium was the first element to be produced synthetically. The element is named after the Greek word 'technètos', meaning artificial. Technetium has only been naturally found in minute quantities in uranium ore. The isotope ^{99}Tc is produced from the waste products of uranium nuclear fuel. $^{99\text{m}}\text{Tc}$ is produced from irradiated ^{98}Mo (technetium cow). ANSTO is a major producer of $^{99\text{m}}\text{Tc}$.

The spectral signature of technetium has been detected in light from S-type red giant stars. Technetium is made by bombarding molybdenum with deuterons (heavy hydrogen) in a cyclotron and is produced in kilogram quantities.

$^{99\text{m}}\text{Tc}$, with a half-life of six hours, is used in radiotherapy. ^{95}Tc , with a half-life of 61 days, is used as a radioactive tracer. ^{99}Tc , has a very long half-life (2.11×10^5 years) and decays almost entirely by beta decay with no gamma rays. It is used as for equipment calibration. In small concentrations the pertechnetate ion (TcO_4^-) can protect carbon steels and iron from corrosion. This use is limited to closed systems due to its radioactivity.

Provided by the element sponsor sponsor ANSTO

ARTISTS DESCRIPTION

The silver/grey background represents the metallic colour of this rare element. It is radioactive, hence the symbol, has a short half life, and is used for radiotherapy, illustrated by the diagrams of internal organs. Found in minute amounts in Molybdenum, it is mostly synthesised in a cyclotron, by bombarding Molybdenum with deuterium nuclei.

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